
**Petroleum, petrochemical and natural gas
industries — Lubrication, shaft-sealing
and control-oil systems and auxiliaries —**

**Part 1:
General requirements**

*Industries du pétrole, de la pétrochimie et du gaz naturel — Systèmes
de lubrification, systèmes d'étanchéité, systèmes d'huile de régulation
et leurs auxiliaires*

Partie 1: Exigences générales

ISO 10438-1:2007

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 10438-1 was prepared by Technical Committee ISO/TC 67, *Materials, equipment and offshore structures for petroleum, petrochemical and natural gas industries*, Subcommittee SC 6, *Processing equipment and systems*.

This second edition cancels and replaces the first edition (ISO 10438-1:2003), which has been technically revised.

ISO 10438 consists of the following parts, under the general title *Petroleum, petrochemical and natural gas industries — Lubrication, shaft-sealing and control-oil systems and auxiliaries*:

- Part 1: *General requirements*
- Part 2: *Special-purpose oil systems*
- Part 3: *General-purpose oil systems*
- Part 4: *Self-acting gas seal support systems*

Introduction

This part of ISO 10438 was developed jointly with API 614, 5th edition, together with the other three parts of ISO 10438.

NOTE API 614 is equivalent to ISO 10438 (all parts).

Users of this part of ISO 10438 should be aware that further or differing requirements can be needed for individual applications. This part of ISO 10438 is not intended to inhibit a vendor from offering, or the purchaser from accepting, alternative equipment or engineering solutions for the individual application. This can be particularly appropriate where there is innovative or developing technology. Where an alternative is offered, the vendor should identify any variations from this part of ISO 10438 and provide details.

This part of ISO 10438 requires the purchaser to specify certain details and features.

A bullet (•) at the beginning of a clause or subclause indicates that either a decision is required or further information is to be provided by the purchaser. This information should be indicated on the datasheet(s); otherwise it should be stated in the quotation request or in the order.

In this International Standard, United States customary (USC) units are included in brackets for information.

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Petroleum, petrochemical and natural gas industries — Lubrication, shaft-sealing and control-oil systems and auxiliaries —

Part 1: General requirements

1 Scope

This part of ISO 10438 specifies general requirements for lubrication systems, oil-type shaft-sealing systems, dry-gas face-type shaft-sealing systems and control-oil systems for general- or special-purpose applications. General-purpose applications are limited to lubrication systems. These systems can serve equipment such as compressors, gears, pumps and drivers.

This part of ISO 10438 is intended to be used in conjunction with ISO 10438-2, ISO 10438-3 or ISO 10438-4, as appropriate.

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2 Normative references

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The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 7-1, *Pipe threads where pressure-tight joints are made on the threads — Part 1: Dimensions, tolerances and designation*

ISO 10434, *Bolted bonnet steel gate valves for the petroleum, petrochemical and allied industries*

ISO 13706, *Petroleum, petrochemical and natural gas industries — Air-cooled heat exchangers*

ISO 15649, *Petroleum and natural gas industries — Piping*

ISO 15761, *Steel gate, globe and check valves for sizes DN 100 and smaller, for the petroleum and natural gas industries*

ISO 16812, *Petroleum, petrochemical and natural gas industries — Shell-and-tube heat exchangers*

IEC 60079 (all parts), *Electrical apparatus for explosive gas atmospheres*

IEC 60529, *Degrees of protection provided by enclosures (IP Code)*

ANSI/API RP 551, *Process Measurement Instrumentation*

API RP 520 (all parts), *Sizing, Selection, and Installation of Pressure-Relieving Devices in Refineries*

API STD 526, *Flanged Steel Pressure Relief Valves*

ISO 10438-1:2007(E)

API STD 611, *General-Purpose Steam Turbines for Petroleum, Chemical and Gas Industry Services*

API RP 686-96, *Machinery Installation and Installation Design*

ASME B1.1, *Unified Inch Screw Threads (UN and UNR Thread Form)*

ASME B16.5, *Pipe Flanges and Flanged Fittings: NPS 1/2 through 24*

ANSI/ASME B16.11, *Forged Fittings, Socket-Welding and Threaded*

ANSI/ASME Y14.2M, *Line Conventions and Lettering*

ASTM A193/A193M-07, *Standard Specification for Alloy-Steel and Stainless Steel Bolting Materials for High Temperature or High Pressure Service and Other Special Purpose Applications*

ASTM A194/A194M-07, *Standard Specification for Carbon and Alloy Steel Nuts for Bolts for High Pressure or High Temperature Service, or Both*

ASTM E94, *Standard Guide for Radiographic Examination*

ASTM E709, *Standard Guide for Magnetic Particle Examination*

ANSI/AWS D1.1/D1.1M, *Structural Welding Code — Steel*

ISA 18.1, *Annunciator Sequences and Specifications*

NEMA 250, *Enclosures for Electrical Equipment (1 000 Volts Maximum)*

TEMA, *Standards of the Tubular Exchanger Manufacturers Association*, 8th ed.

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3 Terms, abbreviated terms and definitions [iso-10438-1-2007](https://standards.iteh.ai/catalog/standards/sist/4929f171-fdbf-4c04-88b4-iso-10438-1-2007)

For the purposes of this document, the following terms, definitions and abbreviated terms apply.

3.1 Terms and definitions

3.1.1

alarm point

preset value of a parameter at which an alarm warns of a condition requiring corrective action

3.1.2

block-in time

period required after the driver is tripped to isolate a piece of equipment, such as a compressor, from its system and to depressurize it

3.1.3

booster pump

oil pump that takes suction from the discharge of another pump to provide oil at a higher pressure

3.1.4

coast-down time

period required after the driver is tripped for the equipment to come to rest

3.1.5

components

machinery and hardware items, such as reservoirs, pumps, coolers, filters, valves, and instruments, that are part of the system

3.1.6**console**

total system whose components and controls are packaged as a single unit on a continuous or joined baseplate

NOTE 1 With a console, the purchaser is required only to make external connections.

NOTE 2 Rundown tanks and seal-oil tanks that are separately mounted, as well as other items such as instrumentation mounted on the equipment, are not part of the console.

3.1.7**continuous-flow transfer valve**

valve that can simultaneously divert both inlet and outlet flows from one component to its installed spare equipment without altering the continuity of full flow through the transfer valve to the equipment

3.1.8**control oil**

oil required to operate such components as relays, servomotors and power pistons on the main equipment

3.1.9**cool-off time**

period during which oil has to be circulated through the equipment to prevent heat damage after the driver is tripped

3.1.10**device position**

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3.1.10.1**normally open**

de-energized position of a device (e.g. automatically controlled electric switch or valve) remaining in an open position during operation unless energized

NOTE During operation of the equipment, the positions of these devices are not necessarily the same as their on-the-shelf positions.

3.1.10.2**normally closed**

de-energized position of a device (e.g. automatically controlled electric switch or valve) remaining in a closed position during operation unless energized

NOTE During operation of the equipment, the positions of these devices are not necessarily the same as their on-the-shelf positions.

3.1.11**double seal**

seal arrangement that utilizes two seal faces in an opposed configuration, whereby sealing gas is injected between the seal faces

NOTE See tandem seal (3.1.49).

3.1.12**dry gas seal system**

self-acting dry gas seal module and all other components necessary for operation of the self-acting dry gas seal

3.1.13**equipment**

main machinery served by the oil or gas system

3.1.14

fail safe

system or component that causes the equipment to revert to a permanently safe condition (shutdown and/or depressurized) in the event of a component failure or failure of the energy supply to the system

3.1.15

gas-seal module

arrangement of piping, filters and instrumentation used to control and monitor the pressure or flow of seal, buffer or separation gas to the equipment shaft end seals

3.1.16

gauge board

unenclosed bracket or plate used to support and display gauges, switches and other instruments

NOTE A gauge board is not a panel. A panel is an enclosure. Refer to 3.1.31 for the definition of a panel.

3.1.17

general-purpose

usually spared or in non-critical service

3.1.18

local

mounted on or near the equipment or console

3.1.19

mission time

duration of the mission

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NOTE Mission time begins when the equipment or system is 100 % operational, i.e. equipment or system capability has returned to engineered capability, and the equipment or system is ready for service. The mission time ends when the equipment or system can no longer meet the defined mission objectives. To meet the business plan, it is necessary that the actual mission time be equal to or greater than the planned mission time.

3.1.20

main oil pump

oil pump that is normally in operation

3.1.21

maximum allowable temperature

maximum continuous temperature for which the manufacturer has designed the equipment (or any part to which the term is referred) when handling the specified fluid at the specified pressure

3.1.22

maximum allowable working pressure

maximum continuous pressure for which the manufacturer has designed the console or components when handling the specified fluid at the maximum allowable temperature

3.1.23

maximum discharge pressure

(centrifugal pump) maximum specified suction pressure plus the maximum differential pressure the pump with the finished impeller is able to develop when operating at rated speed with fluid of the specified normal relative density (specific gravity)

3.1.24

maximum sealing pressure

highest pressure expected at the seals during any specified static or operating conditions and during start-up and shutdown

NOTE Considerations should include both relief valve settings and relief-valve accumulation pressure.

3.1.25**multiple-package**

total oil supply system whose components are separated into individually packaged units

NOTE With this arrangement, the purchaser is required only to install the interconnections between the packages and the external connections.

3.1.26**normal flow**

total amount of fluid required by equipment components such as bearings, seals, couplings and steady-state controls excluding transient flow for controls or fluid bypassed directly back to the reservoir

3.1.27**normal operating point**

point at which normal operation is expected and optimum efficiency is desired

NOTE This point is usually the point at which the vendor certifies that the performance is within the tolerances stated in the relevant standard.

3.1.28**observed**

when the purchaser is notified of the timing of the inspection or test and the inspection or test is performed as scheduled, whether or not the purchaser or his representative is present

3.1.29**owner**

final recipient of the equipment, who may delegate another agent as the purchaser of the equipment

3.1.30**package**

total system, or part of a system, whose components are mounted on a single baseplate

NOTE A package is complete in all respects, including controls and instrumentation.

3.1.31**panel**

enclosure used to mount, display and protect gauges, switches and other instruments

NOTE Instruments in a panel may be open or enclosed by the panel. (See 3.1.16.)

3.1.32**pressure-limiting valve****PLV**

automatic pressure-limiting device, which opens in proportion to the increase in pressure over the opening set pressure and automatically closes when the upstream pressure is reduced below the set pressure, and which is actuated by the static pressure upstream of the valve

NOTE 1 These devices are not necessarily tight shutoff when closed, i.e. they may have a small leakage flow when closed. These devices are designed for liquid service only and are normally used for limiting the discharge pressure of positive-displacement-type oil pumps and the downstream pressure of fail-open oil-pressure regulating valves when necessary.

NOTE 2 PLVs require a flowing test system in order to test. Normally, these valves are, therefore, tested in the system on which they are installed.

3.1.33
pressure safety valve
relief valve
PSV

automatic pressure-relieving device, which opens in proportion to the increase in pressure over the opening set pressure, has a rapid full opening or pop action characteristic and is actuated by the static pressure upstream of the valve

NOTE The device automatically closes when the upstream pressure is reduced below the set pressure. These devices are considered to be tight shutoff when closed and are normally used in gas, vapour or liquid service.

3.1.34
purchaser
agency that issues the order and specification to the vendor

NOTE The purchaser can be the owner of the plant in which the equipment is installed or the owner's appointed agent.

3.1.35
remote
located away from the equipment or the console, typically in a control house

3.1.36
seal buffer gas
clean gas supplied to the high-pressure side of a seal

NOTE 1 This term was originally used on oil seals and has been replaced with the term "seal gas supply" for clean gas that also serves as the sealing gas for a dry gas seal.

NOTE 2 See ISO 10438-4:2007, Figures D.1 to D.4.

3.1.37
seal gas
dry, filtered gas supplied to the high-pressure side of a self-acting gas seal

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NOTE See ISO 10438-4:2007, Figures D.1 to D.4.

3.1.38
seal gas leakage
gas that flows from the high-pressure side of the seal to the low-pressure side of the seal

3.1.39
secondary seal-gas supply
clean purge gas supplied to the area between the seals of a tandem self-acting gas seal having an intermediate labyrinth

NOTE This gas is at a pressure lower than the process pressure.

3.1.40
self-contained regulator
regulating valve assembly that utilizes or internally senses the controlling pressure or temperature

3.1.41
separation gas
supply of inert gas or air fed into the region between the seal and the shaft bearing

3.1.42
settling-out pressure
maximum pressure the system can reach under static conditions

3.1.43**shaft-driven pump**

oil pump driven by the shaft of one of the main machines served by the oil system

3.1.44**shutdown point**

preset value of a parameter at which automatic or manual shutdown of the system is required

3.1.45**special-purpose application**

application for which the equipment is designed for uninterrupted, continuous operation in critical service and for which there is usually no spare equipment

3.1.46**standby pump**

oil pump that is capable, either automatically or manually, of being immediately brought up to operating speed, and that is capable of operating continuously

3.1.47**standby service**

normally idle piece of equipment that is capable of immediate automatic or manual start-up and continuous operation

3.1.48**stilling tube**

pipe extending into the reservoir from the connection to below pump suction-loss level to prevent splashing and provide free release of foam and gas

NOTE 1 A stilling tube is typically used for non-pressurized returns and has an open top or vent holes to equalize to reservoir pressure.

NOTE 2 See ISO 10438-2:2007, Figure B.24.

3.1.49**tandem seal**

seal arrangement which utilizes two seal faces oriented in the same direction, whereby the outboard seal face acts as a backup seal to the inboard or primary seal face

NOTE 1 A special arrangement of this seal incorporates an intermediate labyrinth seal to allow an inert sealing gas to be injected between the seal faces. In this arrangement, the backup or outboard seal face seals against the inert sealing gas and is not exposed to the process gas.

NOTE 2 See double seal (3.1.11).

3.1.50**unit responsibility**

responsibility for coordinating the technical aspects of the equipment and all auxiliary systems included in the scope of the order

NOTE Responsibility for such factors as the power requirements, speed, rotation, general arrangement, couplings, dynamics, noise, lubrication, sealing system, material test reports, instrumentation, piping and testing of components is included.

3.1.51**vendor
supplier**

agency that manufactures, sells and provides service support for the equipment

NOTE The vendor may be the manufacturer of the equipment or the manufacturer's agent and normally is responsible for service support.

3.1.52

vent gas

seal gas leakage that is taken away by the vent system

3.1.53

vent system

arrangement of piping and valves used to take gas to a safe location

3.1.54

witnessed

inspection or test where the purchaser is notified of the timing of the inspection or test and a hold is placed on the inspection or test until the purchaser or his representative is in attendance

3.2 Abbreviated terms

AS	air supply
BWG	Birmingham wire gauge
DN	nominal diameter
DP	differential pressure indicator
FAL	flow alarm low
FC	fail closed
FCV	flow control valve
FE	flow element
FG	flow glass
FI	flow indicator
FIC	flow indicator controller
FL	fail locked (when labelling a valve)
FO	fail open (when labelling a valve)
FRO	flow restriction orifice
FT	flow transmitter
FY	I/P (current to pneumatic) interposing relay
LC	level controller
LG	level gauge
LIC	level indicator controller
LSH	level switch high
LSHH	level switch high high
LSL	level switch low

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LSSL	level switch low low
LT	level transmitter
LV	level valve
LY	level relay
NC	normally closed
NDT	non-destructive testing
NO	normally open
NPS	nominal pipe size
NPT	national pipe thread (tapered)
P&ID	process (piping) and instrument drawing
PCV	pressure control valve
PDCV	pressure differential control valve
PDI	pressure differential indicator
PDS	pressure differential switch
PDSH	pressure differential switch high
PDSL	pressure differential switch low
PDSLL	pressure differential switch low low
PDT	pressure differential transmitter
PI	pressure indicator
PLV	pressure-limiting valve
PN	nominal pressure
PSH	pressure switch high
PSHH	pressure switch high high
PSL	pressure switch low
PSLL	pressure switch low low
PSV	pressure safety (relief) valve
PT	pressure transmitter
TC	temperature controller
TCV	temperature control valve
TI	temperature indicator